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(54) Title: AN INFORMATION PROCESSING SYSTEM CONTAINING AN ARRANGEMENT FOR ENABLING PRINTING ON DEMAND OF POSITION CODED BASES
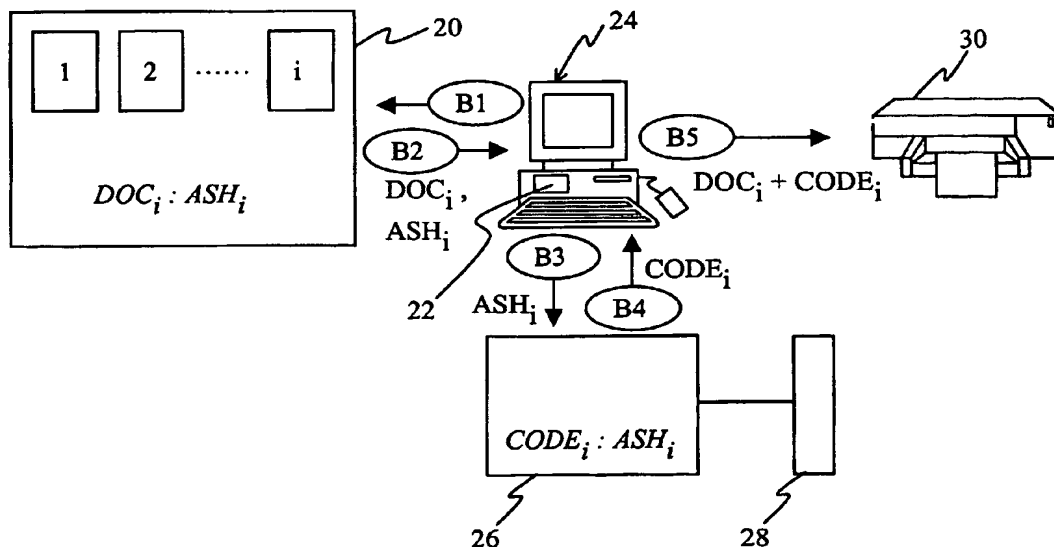
(57) Abstract: An information processing system contains an arrangement for enabling printing on demand of position-coded bases. In the arrangement, a current graphical object is selected from a set of graphical objects prestored in the system, which each define graphic information and corresponds to a rule object which connects at least one processing measure to the graphic information. In the arrangement, the current graphical object is assigned position data from a position data bank. The assigned position data can then be applied, together with the graphic information, to a substrate for forming the position-coded base. The arrangement also provides allocation data in the system, which associates the assigned position data with the graphical object in such a manner that position data read from the base by means of a digital pen device can be processed in the system using the adequate rule object.

WO 2004/038651 A1

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE,* *DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

— *of inventorship (Rule 4.17(iv)) for US only*

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

AN INFORMATION PROCESSING SYSTEM CONTAINING AN ARRANGEMENT FOR ENABLING PRINTING ON DEMAND OF POSITION CODED BASES

Cross-reference to Related applications

The present application claims the benefit of Swedish patent application No. 0203128-4, filed on October 24, 2002, and U.S. Provisional patent application

5   No. 60/421,055, filed on, October 25, 2002, which both are hereby incorporated by reference.

Field of the Invention

The present invention relates generally to collecting and processing of information. More specifically, the

10   invention concerns processing of information detected on a position-coded base, and generation of such position-coded bases.

Background Art

Traditionally, information is collected by using

15   preprinted forms that are distributed to one or more users with a request to fill in and return the form. The information noted on the forms by the users is then inputted, either manually or by automated scanning and interpretation, into an electronic information processing

20   system. Such collecting of information is laborious and time-consuming work and involves a risk of inputting incorrect information into the system.

In WO 01/48685, WO 01/48678 and WO 01/48591, which are herewith incorporated by reference, the present

25   applicant has therefore suggested information processing systems based on forms containing a position code. The position code, which codes a plurality of positions on the form, enables electronic detection of information that is written on the form by means of a digital pen

30   which detects the position code. By connecting different positions on the form to different measures, a receiving unit may be caused to automatically extract the desired data from the electronically detected information. In the system also the receiving unit can be identified by the

detected positions. In fact, the position code enables coding of coordinates for a large number of positions, many more than the number of necessary positions on the individual form. Thus it may be regarded as a virtual

5   position surface being made up by all the positions which the position code is capable of coding. By dedicating different parts of the position surface to different operators, the detected information can be automatically directed from the pen to the correct operator for pro-

10 cessing.

Moreover Applicant's Patent Publication WO 02/19260, which is herewith incorporated by reference, discloses a development tool for producing on the one hand a position-coded base to be distributed to users of digital

15 pens and, on the other hand, software for receiving and processing the information detected by the pens on the base.

Furthermore Applicant's Patent Publication WO 01/71475 discloses a system for multi-party editing of

20 documents. The system allows a coordinator to create on a local unit an electronic document, to allocate by a central processing unit an area of the above position surface, and to request printing of one or more position-coded bases corresponding to the electronic document.

25 The central processing unit later receives editing information which is detected by means of digital pens on the bases. The editing information is allowed to operate on the electronic document and the result of this is presented to the user on the local unit. Thus the system

30 is connected to one and the same coordinator initiating the collecting of data and being presented the result thereof.

Summary of the Invention

An object of the invention therefore is to overcome

35 the limitations of the above-described prior-art technique. More specifically, the invention aims at providing a general and transparent system for generation on demand

of position-coded bases. By transparent is meant that
each user is allowed to be unaware of the flow of data
in the system, independently of whether the user has
the role of creating the electronic document, requesting
generation of the base or using a digital pen in the
system.

These and other objects that will be evident from
the following description are now wholly, or at least
partly, achieved by arrangements according to claims 1,
23 and 30, an information processing system according to
claim 33, and methods according to claims 34, 41 and 45.
Preferred embodiments are defined in the dependent
claims.

Brief Description of the Drawings

The invention and its advantages will be described
in more detail below with reference to the accompanying
schematic drawings which by way of example illustrate
currently preferred embodiments.

Fig. 1 is a view of a base containing a graphics
layer and a coding layer.

Fig. 2 is a view of an arrangement for recording a
document in an information processing system.

Fig. 3 is a view of an arrangement for printing on
demand of a position-coded base.

Fig. 4 is a view of an information processing system
based on position-coded bases and digital pens.

Figs 5-8 are views of alternative embodiments.

Description of Preferred Embodiments

Now follows a description of different arrangements
for enabling printing on demand of bases with embedded
functionality, for use in an information processing sys-
tem.

Such a base 2, shown in Fig. 1, contains on the one
hand a graphics layer 4 with human readable information
and, on the other hand, a coding layer 6 with computer
readable position information. In Fig. 1, the graphics

4

layer and the coding layer have been separated from each
other for reasons of clarity.

The graphics layer 4 contains such information as is
usually created by an individual and applied to a sub-
5   strate to be understood by other people. The graphics
layer may thus contain text, images, figures, frames,
lines etc. and aim at instructing, controlling and/or
informing a user. For example, the graphics layer may
define a form, a poll, an e-mail, a fax form, a draft
10   text, a drawing etc.

The coding layer 6 contains a position code which
codes positions in the entire area or parts of the area
covered by the graphics layer 4. The coding layer 6 is
thus incorporated in the base 2 in a given spatial rela-
15   tionship with the graphics layer 4.

Fig. 1 shows an enlarged section A of the position
code in the coding layer 6. The position code may be of
the kind as described in WO 01/26032, which is herewith
incorporated by reference. Such a position code is cap-
20   able of coding a very large number of positions, consi-
derably more than can be incorporated in an individual
base. This can be regarded as the position code making up
a virtual surface 8 of global positions, and one or more
subsets 10 of these global positions being coded in the
25   coding layer 6.

The virtual position surface 8, which contains con-
tinuous sequences of positions in at least two dimen-
sions, can be logically divided into different sections,
as disclosed in aforesaid WO 01/48685. The sections can
30   in turn be divided into "segments", each containing a
number of "shelves" which can be divided into "books",
each containing a number of so-called logic pages. The
position of a certain logic page on the virtual surface
can thus be noted as a page address of the form:
35   section.segment.shelf.book.page, for instance
1.231.841.334.226, more or less like an IP address. With
knowledge of this division, a global position on the

virtual position surface 8 can be converted into a page
address and a local position on the corresponding virtual
position page 10. Thus, it is possible to map pages on
the virtual position surface 8 against physical bases.

5   However, it should be pointed out that the virtual
position surface 8 need not be given a logic page divi-
sion. Instead, spatially separate parts of the virtual
position surface 8 can be mapped against an individual
physical base, as also disclosed in aforesaid
10   WO 01/48685.

The position code in the coding layer 6 can alter-
natively be of the kind described in WO 99/50787, which
is herewith incorporated by reference. Here the position
code makes up a position space which is predivided into
15   pages. All pages contain the same positions and are dis-
tinguished by a unique page identity. Thus both local
positions on the base and the unique page identity are
coded directly by the position code in the coding layer
6.

20   For either kind of position code, the positions in
the coding layer 6 are connected on the one hand to the
graphic information in the graphics layer 4 and, on the
other hand, to measures in an information processing
system, thereby creating active areas on the base 2. By
25   active areas are thus meant areas on a base which are
connected to measures in the information processing
system.

The information processing system contains a digital
writing unit, in the following referred to as digital
30   pen, which is capable of physically making a mark on the
base 2 using a pen point and at the same time reading the
position code on the same. Such a pen is described in the
above-mentioned WO 01/26032. Thus the digital pen detects
by the position code its absolute location on the base 2
35   and can thus create an electronic version of its motion
over the base 2. The pen is also capable of communicating
such detected position information, which can correspond

to physical strokes on the base 2, to a service handler
on a server in the information processing system.

The service handler receives the position informa-
tion and processes this while using the known connection
5   between measures and positions on the base.

Printing on demand of this type of base involves at
least three separate processes which must be coordinated
in the information processing system: 1) creating the
graphics layer, 2) assigning position data to the coding
10 layer, and 3) processing received position data in the
service handler.

First embodiment of information processing system

Fig. 2 illustrates an arrangement for creating
the graphics layer 4 and connecting this to a service
15 handler in the system.

A graphics file DOC_i is created on a designing
computer 12 using an arbitrary, conventional program 14
for e.g. word processing, image processing, drawing or
desktop publishing. The designing computer 12 also
20 contains a conversion program 16 which allows the user to
select and/or define active areas in the graphics layer
4. The conversion program outputs a definition file,
called a PAD file, which defines the position of each
active area in a local coordinate system. This coordinate
25 system can be defined relative to an arbitrary reference
point on the base 2, for instance a corner. In the case
of the virtual position surface 8 being divided into
logic pages of a known size, the local coordinate system
can be defined relative to a reference point on such a
30 logic page. The PAD file can then be used by a manually,
or automatically, created processing program $PROC_i$ to
associate received position information with the respec-
tive active area and process this according to an asso-
ciated measure/associated measures.

35 Alternatively, the processing program $PROC_i$ can be
created to operate without access to a PAD file. In this

case, the definition data of the PAD file is incorporated
in the processing program.

The processing program $PROC_i$ is then stored,
optionally together with the PAD file, at a unique
5   network address ASH_i in the system to form the above-
mentioned service handler 18 (step A2).

The system contains a graphics repository 20 with a
first interface for receiving and storing graphics files.
Thus, the corresponding graphics file DOC_i may be
10   registered in the graphics repository 20 by being stored
therein in association with the unique address ASH_i (step
A1). If the network is based on the Internet, the address
can be, for instance, a URL (Uniform Resource Locator) or
an IP address (Internet Protocol). Generally, the system
15   contains many different services handlers 18, which can
be stored on one and the same physical unit or be
distributed among a plurality of physical units.

Fig. 3 illustrates an arrangement for printing a
base 2 with a graphics layer and a coding layer.
20   The graphics repository 20 has a second interface
for exposing and reading graphics files stored therein.
A browser program 22, which is installed in a network-
connected computer 24, is used to show through the second
interface accessible graphics files DOC_1-DOC_i in the gra-
25   phics repository 20. The graphics files can be shown on
the display of the computer in the form of a list, a
set of thumbnail images, an image map etc. The user can
select one of the graphics files shown using a computer
mouse, keyboard, speech control etc. When the user thus
30   by the browser program selects a graphics file DOC_i to
be printed (step B1), this graphics file DOC_i is returned
to the browser program 22 through the second interface
together with the associated network address ASH_i (step
B2). Subsequently, the browser program 22 contacts,
35   automatically or on command, a position assigner 26 with
a request for position data to the coding layer (step
B3). The request may contain an indication of number of

8

pages, page format (A4, A3, B4, Letter etc.), number of
printout copies and the associated network address ASH_i.
Optionally, the indication of the number of pages and/or
page format can be replaced by the graphics file DOC_i

5   being included in the request. Alternatively the number
of pages and/or the page format and/or the number of
printout copies are given by standard settings in the
position assigner 26, which means that such particulars
need not be included in the request.

10   In certain cases, access to the PAD file may be
necessary for the generation of the request for position
data. For example, it may be necessary to include in the
request information about the size and function of each
active area to which position data is to be assigned. To

15   this end, the PAD file can be stored in the graphics
repository 20 to be read by the browser program 22.
Alternatively, relevant information from the PAD file may
be incorporated into the graphics file upon registration
in the graphics repository 20. Thereby, the browser

20   program 22 may at least partly create the request based
on the PAD file.

        The position assigner 26, which has access to a
database 28 with at least part of the position/page space
that is made up by the position code, allocates at least

25   one unique position area (or at least one unique page
identity) for each physical page and each printout copy
in the request. In allocation, a marker is set in the
position assigner 26 or the database 28 indicating that
the position area (or the page identity) is blocked for

30   further use. The position assigner 26 also stores a
connection between the assigned position area (or page
identity) and the network address ASH_i.

        In response to the request, the position assigner 26
returns assignment data $CODE_i$ corresponding to the allo-

35   cated position area (or the allocated page identity)
(step B4). The assignment data $CODE_i$ may include either
of, for example, one or more page addresses/identities,

two opposite corner positions for the respective position area, a file with an algorithm for generating a corresponding position code, or a file containing a corresponding position code. The assignment data $CODE_i$

5 can alternatively be represented by a single global position for a position area, after which the browser program 22 can compute the other allocated global positions for the position area since its size is known.

According to an alternative, a request is sent

10 directly from the graphics repository 20 to the position assigner 26, after which the browser program 22 receives assignment data $CODE_i$ from either the graphics repository 20 or the position assigner 26.

The browser program 22 then puts together a graphics

15 layer, which is given by the graphics file DOC_i, and a coding layer, which is given by the assignment data $CODE_i$, in a printout file which is sent to a printer 3 to be printed on a suitable substrate, such as paper, plastic, laminate etc (step B5). Alternatively, this putting-

20 together takes place in the printer 30. According to a further alternative, the request to the position assigner 26 is sent from the printer 30 instead which thus also receives the assignment data $CODE_i$.

Fig. 4 illustrates an arrangement for use of a

25 printed base 2. For reasons of clarity, only the graphics layer is shown.

The user writes on the base 2 using a digital pen 32, which detects what is written in the form of sequences of positions forming electronic strokes. Then

30 the pen 32 is caused to send the detected information, for instance by detecting positions within a "send" area 2A, known to the pen, on the base 2, or by the user activating a button (not shown) on the pen 32. The pen 32 is caused to send an address query to a router 34 at a

35 predetermined network address (step C1). The address query may contain a page identity or a global position which has been decoded from the base. The global position

can alternatively be sent in the form of the page address
discussed by way of introduction.

The router 34 receives the address query and iden-
tifies the network address ASH_i of the current service

5   handler 18. This may take place via a corresponding
query to the position assigner 26 (steps C2A-C2B).
Alternatively, the position assigner 26 can be designed
to inform the router 34, in each allocation, of the
associated connection between the assigned position area

10 and the network address ASH_i. The router 34 may then also
contain a cache memory (not shown) which stores the most
recently routed and/or allocated position areas and the
associated network addresses.

The router 34 then returns a reply message with the

15 current network address ASH_i to the pen 32 (step C2C),
which connects to this address and transfers the
positions that have been detected on the base 2 (step
C3). The thus transferred positions can be local or
global, depending on whether the detected positions are

20 converted from the global coordinate system of the
position surface to the local coordinate system of the
base by the digital pen 32 or by the service handler 18.
If full pages on the continuous position surface are
mapped against physical pages, this conversion can be

25 effected with knowledge of the page division of the posi-
tion surface. No conversion is needed when the position
code directly codes both a page identity and local
positions on the base. In case arbitrary position areas
on the position surface are mapped against individual

30 active areas on physical pages, the conversion may take
place after a conversion query in the position assigner
26. Thus, the position assigner 26 could store a
connection between the position of each active area in
local positions and a corresponding allocated position

35 area in global positions. Thus, the position assigner 26
can, when receiving a global position in an active area,
return a corresponding local position.

11

The system according to Figs 2-4 is general in so
far as each authorized user may select each registered
graphics file to be printed with a position code. The
system is also transparent by the user not having to be
5   aware of the flow of data, or take any measures in
addition to selecting a graphics file, to generate the
printout. The system can also be made transparent for the
user who wants to create a new graphics file and record
this in the system. The data that is noted on the base is
10   also transmitted automatically to the correct service
handler in the system, without the user having to take
any measures in addition to initiating the transmission.

With a view to avoiding reiterations, the following
description of further embodiments is focused on
15   differences from the above embodiment. The same reference
numerals are used to indicate equivalent elements and
steps.

Second embodiment of information processing system

Fig. 5 illustrates an information processing system
20   allowing access to a plurality of service handlers 18 at
one and the same network address ASH_c, via a service
administrator 36 at this network address. The system may
contain several such service administrators 36 which each
administer a plurality of service handlers 18. These ser-
25   vice handlers 18 can be included in the same physical
unit as the service administrator 36, or be separate from
and network-connected to the same.

In the system according to Fig. 5, a document iden-
tifier (document ID, DOC-ID) is used to logically connect
30   in the system the coding layer to the graphics layer of a
base 2. Each document ID is essentially unique in the
system and may contain characters and/or numbers with an
arbitrary number base.

A document ID can be assigned to a graphics file
35   DOC_i in connection with the creation thereof, i.e. in the
designing computer 12. Alternatively, as shown in Fig. 5,
the graphics repository 20 can be designed to assign a

document ID in its registration of the graphics file DOC_i and return this to the designing computer 12 (step A1B). Thereupon, the processing program $PROC_i$ and the associated document ID (and optionally the PAD file) may
5   be transmitted to the service administrator 36 for recording (step A2).

In all cases, a document ID can be generated separate from the current graphics file DOC_i, for instance based on a character or number series, or a combination
10   thereof, or by a random number generator. Such a document ID can be incorporated in the graphics file. It may in some cases, as will be discussed in more detail below, be advantageous to generate the document ID based on the contents of the current graphics file DOC_i, for instance
15   by a hash operation on the entire graphics file or parts of the graphics file.

In its registration of the graphics file DOC_i, the graphics repository 20 stores a connection between the graphics file DOC_i and its document ID and also the
20   network address ASH_c of the service administrator. However, the connection to the document ID may be inherent if the document ID is directly computable from the entire contents or parts of the contents of the graphics file.

25   The service administrator 36 receives the processing program $PROC_i$ and the associated document ID (and optionally the PAD file), and stores the connection between them. The processing program $PROC_i$ forms, as stated above, a service handler 18, but is not given a
30   network address available to the pens 32 in the system.

Selection of graphics file, position assignment and printout are effected in the same way as in the previous embodiment. However, also the document ID is communicated from the graphics repository 20 to the position assigner
35   26 (step B3) which stores a connection between the assigned position area (or page identity) and the

document ID, in addition to the connection to the network address ASH_c of the service administrator 36.

The printed base 2 is also used in the same way as in the previous embodiment. When receiving positions
5   detected on the base 2 (after step C3), the service administrator 36 fetches the associated document ID to be able to identify the corresponding processing program $PROC_i$. To this end, the service administrator sends a request to the position assigner 26 containing a global
10   position/page address/page identity which originates from the current base 2 (step D1). The position assigner 26 returns a reply message with the current document ID (step D2). Subsequently the service administrator 36 sends the received positions to the service handler 18
15   which is identified by the document ID in the received reply message.

It should be pointed out that the document ID can alternatively be transferred, automatically or on command, from the position assigner 26 to the router 34
20   which attaches the current document ID to the reply message to the pen 32, which in turn sends the document ID with the detected positions to the service administrator 36. In this case, the service administrator 36 need not send a separate request to the position assigner 26.
25   It will also be appreciated that the network address ASH_c of the service administrator 36 need not be stored and communicated in the system if the digital pens 32 are directly connected to one service administrator 36 only. This is also the case if the service administrator 36 is
30   associated with a superordinate position area on the virtual position surface, for instance a segment or section, and the router is instructed to direct everything detected in this superordinate position area to a certain service administrator.
35   According to one more alternative (not shown), both the graphics file DOC_i and the processing program $PROC_i$ (and optionally the PAD file) are sent to the graphics

repository 20 to be stored therein. The service
administrator 36 is designed to fetch, when receiving the
document ID from the position assigner 26 or the pen 32,
from the graphics repository 20 the processing program
5   PROC$_i$ which corresponds to the received document ID.

According to yet another alternative (not shown),
the connection between the assigned position data CODE$_i$
and the document ID is not stored in the position
assigner 26. Instead, information about the assigned
10   position data CODE$_i$ is communicated, conveniently by the
browser program 22, from the position assigner 26 to the
graphics repository 20, which stores said connection.
When receiving positions from a digital pen 32, the
service administrator 36 consequently contacts instead
15   the graphics repository 20 with said document ID request
which contains a global position/page address/page
identity.

Third embodiment of information processing system

Fig. 6 illustrates an information processing system
20   whose graphics repository 20 contains a file generator
20A which is capable of generating, on command or auto-
matically, the processing program PROC$_i$ based on the
graphics file DOC$_i$.

In the same way as in the second embodiment of
25   Fig. 5, the service administrator 36 fetches a current
document ID on the basis of the received positions from
the pen 32 (steps D1-D2). In the third embodiment of Fig.
6, however, the service administrator 36 then sends a
request containing the current document ID to the
30   graphics repository 20 (step D3). The graphics repository
20 identifies, on the basis of the received document ID,
the corresponding graphics file DOC$_i$ and applies the file
generator 20A thereto for generating the processing
program PROC$_i$, which is then sent to the service
35   administrator 36 (step D4).

The service administrator 36 is conveniently design-
ed to store such received processing programs PROC$_i$, with

connection to the document ID, for reuse in any future
receiving of positions from the associated base 2 in the
system.

    According to an alternative (not shown), the
5   graphics repository 20 is designed to automatically
generate, when recording a graphics file DOC_i, the pro-
cessing program $PROC_i$ and send this with the document ID
to the service administrator 36 to be stored therein.

    It will be appreciated that also the network address
10 ASH_c of the service administrator 36 can be stored and
communicated in the system like in the second embodiment
of Fig. 5.

    In the above embodiments, the selection of graphics
file DOC_i to be printed is effected among the files that
15 are stored in the graphics repository 20. However, it is
possible for the browser program 22 to allow selection of
a graphics file on an arbitrary unit, such as a local
computer, a network-connected server etc. In this case,
the browser program 22 verifies the selected graphics
20 file against the files DOC_1-DOC_i in the graphics
repository 20 before positions are allocated in the
position assigner 26. This verification can be easily
carried out if all document IDs in the system are
computed based on the contents of the associated graphics
25 file. In this case, the graphics repository 20, the
browser program 22 or the position assigner 26 carries
out a computation of the document ID for the selected
graphics file and matches this against stored document
IDs in the graphics repository. A corresponding matching
30 can be carried out if the document ID is incorporated in
the graphics file.

    It may also be advantageous for the graphics repo-
sitory 20 to contain a format converter (20B in Fig. 6).
Thus the graphics files DOC_i can be stored in the
35 graphics repository 20 in an image format, such as PNG,
JPEG, GIF, TIFF or PDF, for display by the browser
program 22. Before a graphics file DOC_i selected by the

browser program 22 is transferred to the browser program
22, the format converter 20B is caused to convert the
graphics file to a printout format, such as Postscript or
PCL.

5   In some applications, it may be desirable for the
service handler 18 also to have access to its correspond-
ing graphics file, for instance in order to show the
received position information against the background of
the current graphics layer. In these cases, the graphics
10   file can be stored with the processing program in the
service handler 18 or the service administrator 36, or
the service handler 18 or the service administrator 36
can be designed to request, when required, the current
graphics file from the graphics repository, e.g. based on
15   the document ID.

      It should be pointed out that the above embodiments
allow a user to modify a selected graphics file DOC_i
before printout. In the first and second embodiments of
Figs 2-5, the user is allowed to modify the graphics
20   file DOC_i to such an extent that the active areas are
not affected, for instance by adding further graphic
information (text, images etc.) since also such modified
graphics files can be processed by the existing
processing program $PROC_i$. In the third embodiment of Fig.
25   6, the user has still greater freedom to create and
record new graphics files based on existing graphics
files in the graphics repository 22, since the processing
program $PROC_i$ can be generated on demand by the file
generator 20A.

30   In the above embodiments, position data from the
pens 32 is received by the service administrator 36,
which forwards the entire position data or parts of the
position data to the intended service handler 18. As an
alternative to this forwarding, the service administrator
35   36 may return a network address to the pen 32, which has
to connect to and transfer position data to the intended
service handler 18 at this network address.

Fourth embodiment of information processing system

Fig. 7 illustrates an information processing system which is designed to conveniently allow for changes in the address of the service handler. To this end, the
5   address is registered in the router 34 only, in association with a document ID which migrates in the system from the graphics repository 20 to the router 34 via the browser program 22 and the position assigner 26.

Before describing the fourth embodiment in some
10   detail, certain further presumptions and definitions should be clarified.

The system is based on the above-mentioned logic pages, and includes digital templates that define properties of a certain part of the virtual position
15   surface, for example a section, segment, book or shelf. These properties include size and location of logic pages on the virtual position surface, size and location of any predefined active areas on the logic pages, any predefined function of these active areas, etc. Such
20   digital templates are further described in aforesaid WO 01/48685. In the present case, the virtual position surface comprises at least one segment that is dedicated to dynamic printing of documents. Consequently, the system includes one corresponding digital template for
25   all logic pages of this segment.

A logic page given by such a digital template corresponds to a position code that can be applied as it is on a base. Alternatively, different partial areas of the position code of the logic page be "cut out" and
30   arranged in a different spatial arrangement on a base. The different partial areas of the logic page may correspond to the predefined active areas, which may have predefined functions in the system.

In this fourth embodiment, the above-mentioned
35   definition file (PAD file) is created to identify the relevant digital template, and the size and location of all selected and/or defined active areas in local

coordinates on a logic page given by the template. It
should be noted that the PAD file in not uniquely
connected to any specific logic page at this stage, but
rather to the range of logic pages within the segment
5   given by the digital template.

After creation of the graphics layer in the
designing computer 12, the graphics file DOC_i is
registered, automatically or on command, in the graphics
repository 20 (step A1), where it is stored in
10 association with a unique document ID and the PAD file.
Optionally, the document ID and/or the PAD file could be
incorporated in the graphics file DOC_i. Automatically or
on command, the PAD file is registered in the service
handler (step A2A), and the association between the
15 document ID and the service handler address ASH_i is
registered in the router 34 (step A2B). Concurrently, the
processing program $PROC_i$ is developed and stored to form
the service handler (step A2C).

The browser program 22 allows for selection and
20 retrieval of a document DOC_i from the graphics repository
20, together with the associated document ID and PAD file
(steps B1-B2). The browser program 22 also generates a
document instance ID (print ID) to uniquely identify the
specific position assignment/print-out. Thus, each print
25 ID is essentially unique in the system and may contain
characters and/or numbers with an arbitrary number base.
The browser program 22 includes the document ID and the
print ID in the request for position data that is sent to
a first interface of the position assigner 26 (step B3A).
30 The position assigner 26 allocates one or more logic
pages, and returns assignment data $CODE_i$ in the form of
the page address(es) of the allocated logic page(s) (step
B4). In this process, the position assigner 26 stores a
connection between the range of allocated page addresses
35 and the document ID and print ID. Concurrently, the
browser program 22 may request instance data from an
instance database 27, for example to include such data in

the graphics layer on the base. The browser program 22
also submits the print ID to the instance database 27,
which stores the association between the print ID and
instance data (step B3B). For example, the instance
5   database 27 may be an external database storing personal
data of the different users of the system, such as names,
addresses, company affiliations etc.
        The browser program 22 then prepares the coding
layer by arranging the local positions of the allocated
10   logic page(s) according to the definitions of PAD file.
The coding layer and the graphics layer are then sent to
the printer for generation of the base (step B5).
        In the process of generating and processing position
data from the thus-printed base, an address query is
15   first sent from the pen 34 to the router 34. The address
query may include a global position or a page address
given by the position code on the base (step C1). On
receipt thereof, the router 34 submits a corresponding
query to a second interface of the position assigner 26
20   (step C2A), whereupon the position assigner 26 returns
the document ID that is associated with the page address
as indicated by the query (step C2B). The router 34 then
identifies the service handler address ASH_i from the
thus-received document ID and submits this address to the
25   pen 34 (step C2C). Then, the pen 34 sends detected
position data to the address ASH_i, whereupon the
processing program $PROC_i$ is executed to process the
position data, based on the definitions in the PAD file.
In case instance data is needed, the service handler may
30   send a request with the page address to a third interface
of the position assigner 26 (step D1). Based on the page
address, the position assigner 26 may identify the print
ID and submit a corresponding request to the instance
database 27 (step D2), which may return the instance data
35   UD (step D3). Subsequently, the position assigner 26 may
submit the instance data to the service handler.
Alternatively, the print ID may be submitted in a request

from the service handler to the instance database, after
the service handler having obtained the print ID from the
position assigner 26.

Thus, the print ID includes an identification of
5   instance data to be accounted for in the processing of
position data from a specific print-out at the service
handler, and optionally to be included in the graphics
layer on the base. As an alternative or complement to the
use of an instance database 27, the print ID as such may
10   include instance data, e.g. name, version number, etc, to
be printed on the base and/or used by the service
handler. Alternatively or additionally, the print ID as
such may include a key, e.g. a network address, which
allows the service handler to request instance data from
15   the instance database.

It should be realized that the system of Fig 7 is
equally applicable to a position code that directly codes
a page identity and local positions on a base, as
discussed above.

20   Likewise, it should be stated that the use of
document instances and the instance database is optional.
Fifth embodiment of information processing system

Fig. 8 illustrates an information processing system
which is designed to allow the user to change the content
25   of the graphic layer and/or the arrangement of the active
areas before printing. The system is also designed to
allow a service handler to process the contents of the
graphics layer, in particular in relation to position
data as received from the digital pen. To this end, PAD
30   file instances and graphics file instances which define
the coding layer and the graphics layer, respectively, of
each printed base, are made accessible to the service
handlers. Further, each service handler address is
registered in the router in association with a unique
35   part of the virtual position surface.

This fifth embodiment makes use of the digital
templates and PAD files described in relation to the

fourth embodiment. The following description focuses on differences over the fourth embodiment.

In step A1, the graphics file DOC_i and the associated PAD file are registered with the graphics repository 20. In step A2B, the service handler address ASH_i is registered in the router 34 in association with a superordinate part of the virtual position surface. This superordinate part is also identified in the PAD file. For example, the superordinate part may be a segment, section, shelf or book. In step A2C, the processing program $PROC_i$ is stored at the address ASH_i.

In steps B1-B2, the browser program 22 is operated to obtain a graphics file DOC_i together with the associated PAD file from the graphics repository 20. Thereafter, the user may operate the computer 24 to edit the graphics file and/or to move/remove existing active areas and/or to add active areas that are predefined in the relevant digital template, as identified by the PAD file. Subsequently, the browser program 22 is operated to generate a graphics file instance DOC_i' from the possibly updated graphics file, and to submit the graphic file instance DOC_i' to an instance file server 27 (step B3B). The instance server 27 may be separate from the depository 20, since the graphic file instances DOC_i' may include user-specific, and potentially sensitive, information that needs strict access control. Concurrently, the browser program 22 is operated to generate an updated PAD file which reflects any changes of the original PAD file and which also includes a key for accessing the graphics file instance DOC_i' in the instance server 27. This updated PAD file forms a PAD file instance PAD_i', which is submitted with the allocation request to the position assigner 26 (step B3A). In step B4, the position assigner 26 allocates one or more logic pages, and returns assignment data $CODE_i$ in the form of the page address(es) of the allocated logic page(s). In this process, the position assigner 26 also

stores the PAD file instance PAD_i' in association with
the allocated page address(es). The browser program 22
prepares the coding layer according to the definitions of
the PAD file instance PAD_i', and the graphics layer
5   according to the graphics file instance DOC_i'. In step
B5, the coding layer and the graphics layer are sent to
the printer for generation of the base.

In steps C1-C3, the router 34 receives position data
from the digital pen 32 and returns the relevant service
10   handler address ASH_i to the pen 32 which in turn submits
the position data to the service handler at this address.

In step D1, the service handler 18 submits a request
for a PAD file instance to the position assigner 26. The
request contains a global position or page address as
15   received from the pen 32 in step C3. In step D2, the
position assigner returns the relevant PAD file instance
PAD_i'. Based on the key included in the PAD file
instance, the service handler may obtain the graphics
file instance DOC_i' from the instance server 27 (steps
20   D3-D4).

In this embodiment, each processing program $PROC_i$ is
designed to operate with all PAD file instances that are
based on the correct digital template, i.e. the digital
template that defines the relevant superordinate part of
25   the virtual position surface (as also registered in the
router). Thus, each service handler may be regarded as
effecting a general service in a respective field of
application, such as note taking, electronic mail, multi-
party document markup, automatic document editing,
30   grading of tests, processing of selection forms,
processing of inventory forms, processing of time
reports, etc. To this end, the processing program $PROC_i$
includes instructions to access the position data of the
active areas identified in the PAD file instance, to
35   operate on this data according to the predefined
functions of the active areas, and to execute service-

specific post-processing instructions on the resulting data.

Such post-processing instructions may include, e.g., incorporating the graphics file instance as a background image to the position data for display of handwritten data, compiling/outputting the resulting data in a specific format, or mapping the resulting data against the content of the graphics file instance. The post-processing instructions may also include retrieval of further instance data, for example as identified by a print ID as in the fourth embodiment. Such further instance data could for example be a master solution or key to be used in the grading of tests.

In a more advanced example, the processing program could be designed to access active areas that are not part of the digital template, but are defined in the editing operation in the computer 24. The PAD file instance may thus be created to also identify and define such user-defined active areas, either with reference to an agreed nomenclature or by incorporating corresponding processing instructions. Alternatively, the active areas are identified in the PAD file instance, whereas the processing instructions are incorporated in the graphics file instance.

In the above embodiment, the graphics files in the depository 20 could be regarded as sample files. Advantageously, the depository includes at least one sample file for each general service in the system.

The system may also include a default general service. Thus, whenever the user of the computer 24 chooses to print a graphical file which is not based on any file in the repository 20, a default PAD file instance is generated for a default digital template related to a default superordinate part of the virtual surface. For example, such a default general service may be designed simply to produce an image of the handwritten data superimposed on the graphical layer.

The skilled person will realize that the above
embodiments, and alternatives thereof, may be combined by
features of one embodiment being applied to another
embodiment. For example, the digital templates and
5   specific PAD files described above in relation to the
fourth and fifth embodiments may also be used in the
first, second and third embodiments.

In one alternative embodiment, the position assigner
may be arranged to allocate predefined sets of logic
10   pages to multiple page documents. For example, a full
logic book may be allocated whenever the number of
physical pages exceeds a given value. Such a logic book
may be indicated by a page address of the format:
section.segment.shelf.book.*, where the symbol * denotes
15   all pages within the book.

In another alternative embodiment, the system allows
for printing of identically position-coded copies of a
graphics file. Thus, the position assigner only allocates
one unique logic page for each physical page in the
20   graphics file. In this case, data detected on the
different copies are distinguished at the service handler
by some other means than the detected positions as such,
for example based on a unique pen identifier received
with the position data, a handwritten reference/command
25   included in the position data, etc.

The drawings illustrate the graphics repository 20,
the position assigner 26, the router 34, the service
administrator 36, and the instance server 27 as separate
physical units. Such a modular construction may be
30   preferred for reasons of administration or manufacture.
However, it is possible to implement at least some of
them in one and the same physical unit, for instance in
order to reduce delays in the system. According to one
alternative, the graphics repository 20 and the position
35   assigner 26 may be combined in one and the same physical
unit. According to another alternative, the position

assigner 26 and the router 34 may be combined in one and
the same physical unit.

These physical units are typically network-connected
computers or servers with software which, when executed
5   in an internal processor, implement the processes that
are performed in the respective units.

It is also to be noted that the above principles for
on-demand printing of coded bases are applicable within a
public network, within a private network, locally within
10   a personal computer or the like, or within any
combination thereof.

26

CLAIMS

1. An arrangement in an information processing system which comprises at least one digital unit which is
5   designed to detect position data on a coded base, the coded base partly being generated from a graphical object which defines graphic information, and at least one processing unit which is designed to receive, from the digital unit, said position data and process said
10 position data according to predetermined rules, each graphical object in the system corresponding to a rule object which is assigned to said at least one processing unit to define said rules, said arrangement comprising:
    a storage unit with a first interface for receiving
15 and storing graphical objects, and a second interface for exposing and reading thus stored graphical objects; and
    an allocation unit which is designed to assign on command, from a position data bank, position data for a current graphical object, and to provide in the system
20 allocation data which associates said assigned position data with the current graphical object;
    said arrangement allowing, by the second interface of the storage unit, selection of the current graphical object and providing, by the allocation unit, said
25 assigned position data, and thus allowing application of said graphic information and said assigned position data to a substrate for forming the coded base.

2. The arrangement as claimed in claim 1, further comprising a directing unit which is designed to direct,
30 on the basis of said allocation data, said position data from the digital unit to a current processing unit among a plurality of processing units in the system.

3. The arrangement as claimed in claim 2, wherein said allocation data comprises an address identifier
35 which is associated with a network address of said at least one processing unit.

4. The arrangement as claimed in claim 3, wherein the directing unit is designed to receive at least a subset of said position data from the digital unit, identify on the basis of said position data said address

5　identifier for the current processing unit, and send said address identifier to the digital unit.

5. The arrangement as claimed in claim 4, wherein the allocation unit is adapted to transfer said address identifier to said directing unit, preferably in response

10　to an address query from the same and based on position data included in said address query.

6. The arrangement as claimed in claim 5, wherein each graphical object is associated with a respective address identifier in the storage unit which is adapted

15　to transfer to said allocation unit said address identifier for the current processing unit.

7. The arrangement as claimed in claim 6, wherein the storage unit is adapted to provide said address identifier in connection with the reading of the current

20　graphical object through the second interface, and where-in the allocation unit is adapted to receive said address identifier in connection with the allocation of position data for the current graphical object.

8. The arrangement as claimed in any one of claims

25　2-7, wherein the directing unit is designed to fetch said allocation data from the allocation unit and to send at least a subset of said allocation data to the digital unit to be transferred to the current processing unit.

9. The arrangement as claimed in any one of claims

30　2-7, wherein the current processing unit is designed to fetch at least a subset of said allocation data when receiving said position data from the digital unit.

10. The arrangement as claimed in any one of the preceding claims, wherein said allocation data comprises

35　an object identifier which is associated with the current graphical object.

11. The arrangement as claimed in claim 10, which allows the current processing unit, when receiving said position data from said at least one digital unit, to identify said assigned rule object on the basis of said
5   object identifier.

12. The arrangement as claimed in claim 10 or 11, wherein each graphical object is assigned to an object identifier which is essentially unique in the system.

13. The arrangement as claimed in claim 12, wherein
10   all object identifiers in the system at least are stored in the storage unit.

14. The arrangement as claimed in claim 13, wherein the arrangement allows said selection of the current graphical object only if the object identifier for a select-
15   ed graphical object corresponds to one of the object identifiers stored in the storage unit.

15. The arrangement as claimed in any one of claims 10-14, wherein the object identifier is incorporated in the associated graphical object.

20   16. The arrangement as claimed in any one of claims 10-14, wherein the object identifier is computable based on the graphical object.

17. The arrangement as claimed in any one of the preceding claims, further comprising a browser unit which
25   is connected to the second interface of the storage unit and comprises a display for exposing said graphical object and a means for selecting the current graphical object among graphical objects exposed on said display.

18. The arrangement as claimed in any one of the
30   preceding claims, which is adapted to generate the coded base by printing on demand of said graphic information and said position data on said substrate.

19. The arrangement as claimed in any one of the preceding claims, wherein said position data is
35   incorporated in the coded base in the form of a computer readable position code, which is readable by means of said at least one digital unit.

20. The arrangement as claimed in any one of the preceding claims, wherein the storage unit comprises a format converter which is adapted to convert the graphical object from a first format into a second

5   format.

21. The arrangement as claimed in claim 20, wherein the first format is an image file format, such as PNG, JPEG, GIF, TIFF or PDF, and the second format is a print file format, such as Postscript or PCL.

10   22. The arrangement as claimed in any one of the preceding claims, wherein the storage unit comprises a rule object generator which is designed to generate said rule object from said graphical object, and wherein the storage unit is adapted to provide the thus generated

15   rule object in the system.

23. An arrangement in an information processing system which comprises digital units which are designed to detect position data on coded bases, each coded base being partly generated from a graphical object which

20   defines graphic information, and a plurality of processing units which are designed to receive, from the digital units, said position data and process said position data according to predetermined rules, said arrangement comprising:

25   an allocation unit which assigns, on command, position data for a current graphical object from a position data bank, and provides in the system allocation data which associates said assigned position data with the current graphical object; and

30   a directing unit which directs, on the basis of said allocation data, said position data from the digital unit to a current processing unit among the plurality of processing units in the system;

said arrangement providing, by the allocation unit,

35   said assigned position data, and thus allowing for application of said graphic information and said assigned

30

position data to a substrate for forming one of said coded bases.

24. The arrangement as claimed in claim 23, wherein said allocation data comprises an object identifier which
5   identifies the current graphical object in the system.

25. The arrangement as claimed in claim 24, wherein said allocation unit is arranged to receive said object identifier with the command to assign position data.

26. The arrangement as claimed in claim 24 or 25,
10   wherein the directing unit is arranged to receive and store an association between each object identifier and a network address of one of said processing units.

27. The arrangement as claimed in any one of claims 23-26, wherein said allocation data comprises an instance
15   identifier which identifies the assignment of position data.

28. The arrangement as claimed in claim 27, wherein the instance identifier identifies further graphical data which is to be applied to the substrate together with the
20   graphic information, said arrangement thereby allowing the current processing unit to access, based on said association data, said further graphical data.

29. The arrangement as claimed in claim 27 or 28, wherein the instance identifier includes said further
25   graphical data.

30. An arrangement in an information processing system which comprises digital units which are designed to detect position data on coded bases, each coded base being partly generated from a graphical object which
30   defines graphic information, and a plurality of processing units which are designed to receive, from the digital units, said position data and process said position data according to predetermined rules, said arrangement comprising:
35   an allocation unit which assigns, on command, position data for the current graphical object from a position data bank, and provides in the system allocation

data, which associates said assigned position data with a rule object which represents the current graphical object and defines the predetermined rules;

said arrangement providing, by the allocation unit,
5 said assigned position data, and thus allowing for application of said graphic information and said assigned position data to a substrate for forming one of said coded bases; and

said arrangement providing, by the allocation unit,
10 said allocation data, and thus allowing for one of said processing units, upon receipt of said position data, to obtain the rule object.

31. The arrangement as claimed in claim 30, further comprising a storage unit which is arranged to receive
15 and store the current graphical object, said arrangement providing, by the storage unit, the current graphical object in the system, and thus allowing for one of said processing units, upon receipt of said position data, to obtain the current graphical object.

20 32. The arrangement as claimed in claim 31, wherein said allocation unit provides in said system locating data, which identifies the location of the current graphical object in the storage unit, said arrangement providing, by the allocation unit, said locating data,
25 and thus allowing for one of said processing units, upon receipt of said position data, to locate the current graphical object.

33. An information processing system, which comprises at least one digital unit which is designed to
30 detect position data on a coded base; a processing unit which is designed to receive from the digital unit said position data and process the same according to predetermined rules, and an arrangement according to any one of claims 1-32.

35 34. A method of performing, in an information processing system, generation on demand of a position-coded base, said method comprising:

detecting a selection of a current graphical object among a set of graphical objects pre-stored in the system, each defining graphic information and corresponding to a rule object which connects at least
5   one measure to the graphic information;

assigning from a position data bank position data for the current graphical object;

applying said assigned position data and the graphic information defined by the current graphical object to a
10 substrate for forming said base; and

providing in the system allocation data which associates said assigned position data with the graphical object in such a manner that position data read from the base can be processed using the rule object that
15 corresponds to the current graphical object.

35. The method as claimed in claim 34, wherein the rule object connects said at least one measure to at least one position in a local coordinate system which is defined relative to a reference point in the graphic
20 information, which method comprises converting said read position data into at least one position in said local coordinate system prior to processing.

36. The method as claimed in claim 35, wherein said assigned position data contains at least one position in
25 a set of positions, which is divided into predetermined groups of positions, and wherein the step of converting said read position data is carried out with knowledge of the division of the set of positions.

37. The method as claimed in claim 35, wherein said
30 allocation data comprises a connection between said assigned position data and at least one corresponding position in said local coordinate system, and wherein the step of converting said read position data is carried out based on said allocation data.

35 38. The method as claimed in any one of claims 34-37, wherein said rule object defines said measures in relation to a position data reference point, which is

implicitly connected to the graphic information via a
predetermined spatial interrelationship between the
graphic information and the assigned position data on
said substrate.

5   39. The method as claimed in any one of claims
34-38, wherein said allocation data comprises an address
identifier, which is associated with a network address of
a processing unit to which said rule object in the system
is assigned.

10   40. The method as claimed in any one of claims
34-39, wherein said allocation data comprises an object
identifier which is associated with the current graphical
object.

         41. A method of enabling, in an information pro-
15 cessing system, printing on demand of one or more
position-coded bases with graphical information thereon,
said graphical information being given by a graphical
object which defines a number of physical pages, said
method comprising:

20   using a position code which defines a position area
with a predetermined subdivision into units of equal
size;

         generating, based on the graphical object, a rule
object which connects at least one measure to at least
25 one position in a local coordinate system which is
defined relative to a reference point in any one of said
units;

         assigning, on command, one unit for each physical
page defined by the graphical object;

30   providing, in the system, position data for each
assigned unit, for use in the printing of said one of
more position-coded bases;

         generating allocation data which associates the
position data of each assigned unit with the rule object;

35   providing, in the system, said rule object and said
allocation data, for use by a processing unit that

receives position data detected on said one or more position-coded bases.

42. The method as claimed in claim 41, wherein said allocation data allows the processing unit, upon receipt

5   of said position data, to obtain the rule object.

43. The method as claimed in claim 41 or 42, further comprising providing, by a storage unit, the current graphical object in the system, and allowing the processing unit, upon receipt of said position data, to

10   obtain the current graphical object from the storage unit.

44. The method as claimed in any one of claims 41-43, further comprising providing in the system locating data, which identifies the location of the current

15   graphical object in the storage unit, and allowing the processing unit, upon receipt of said position data, to locate the current graphical object.

45. A method of enabling, in an information processing system, printing on demand of one or more

20   position-coded bases with graphical information thereon, said graphical information being given by a graphical object, said system comprising a plurality of processing units which are designed to receive position data detected by digital units on the position-coded bases and

25   to process the received position data according to predetermined rules, said method comprising:

       assigning, on command, position data for a current graphical object from a position data bank;

       providing said assigned position data in the system,

30   for use in the printing of said one of more position-coded bases;

       generating allocation data which associates said assigned position data with the current graphical object; and

35   directing, on the basis of said allocation data, the position data detected by one of the digital units to a

current processing unit among the plurality of processing units in the system.

46. The method as claimed in claim 45, further comprising receiving, with the command to assign position data, an object identifier which identifies the current graphical object in the system, and including said object identifier in said allocation data.

47. The method as claimed in claim 46, further comprising storing an association between each object identifier and a network address of one of said processing units, wherein said directing is effected on the basis of said allocation data and said association.

48. The method as claimed in any one of claims 45-47, further comprising generating an instance identifier which identifies the assignment of position data, and including said instance identifier in said allocation data.

49. The method as claimed in claim 48, further comprising associating the instance identifier with further graphical data which is to be included in the base together with the graphic information, thereby making said further graphical data accessible, based on said allocation data, to the current processing unit.

50. The method as claimed in claim 48 or 49, further comprising including said further graphical data in the instance identifier.
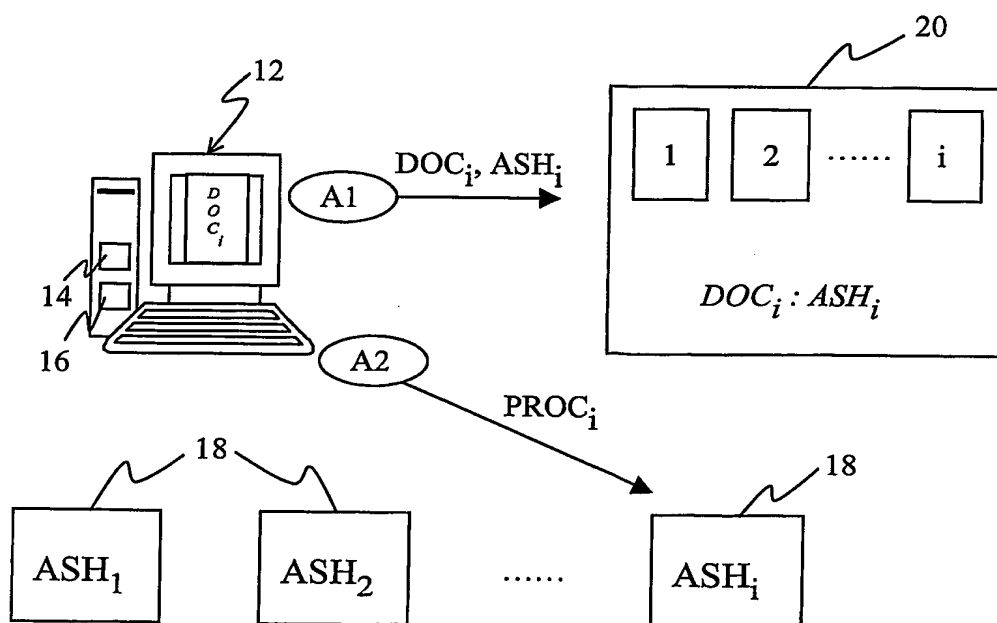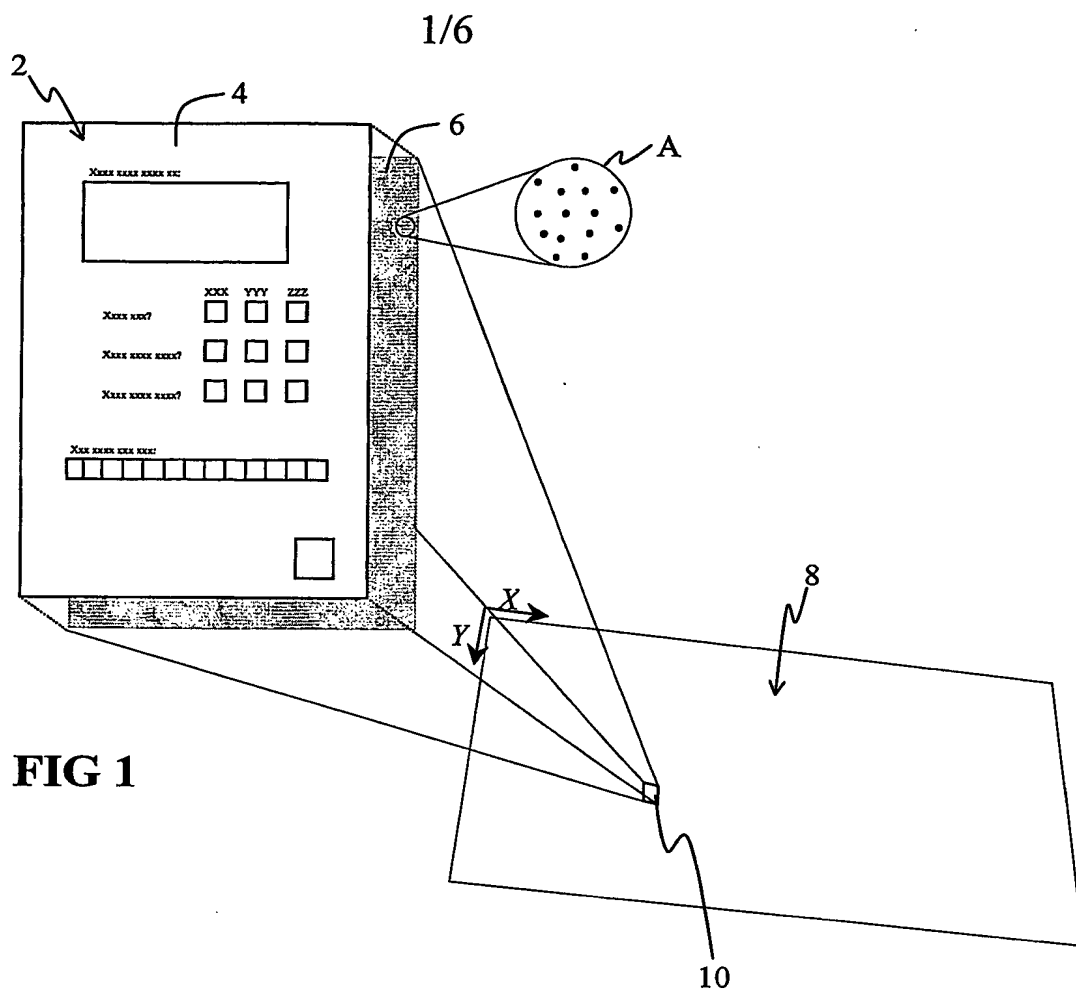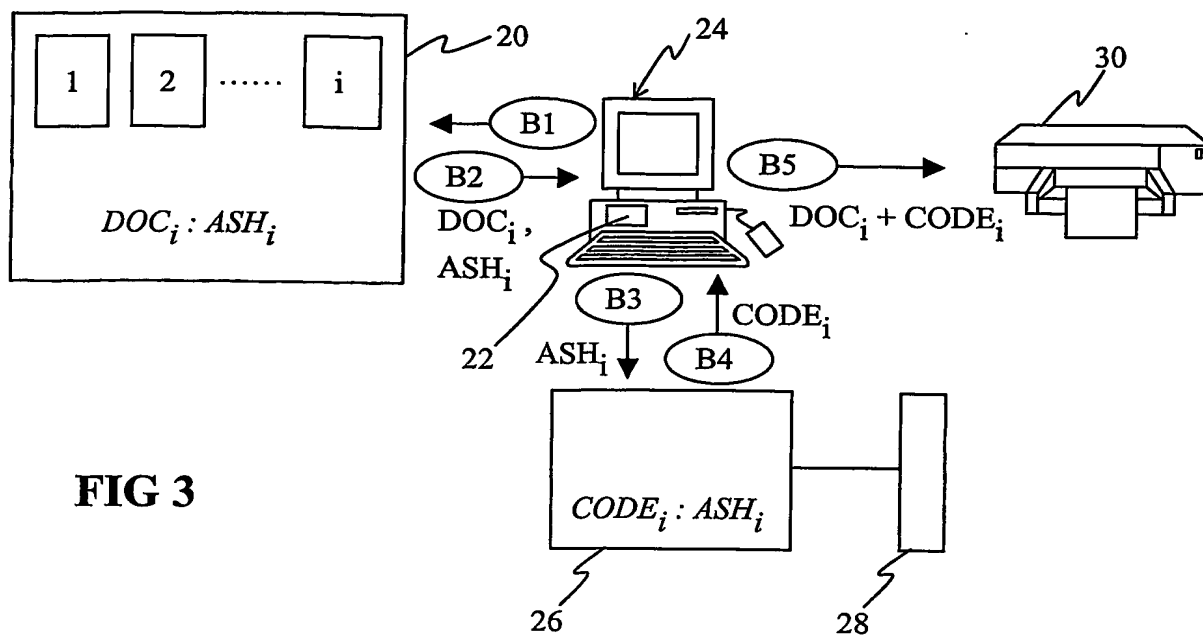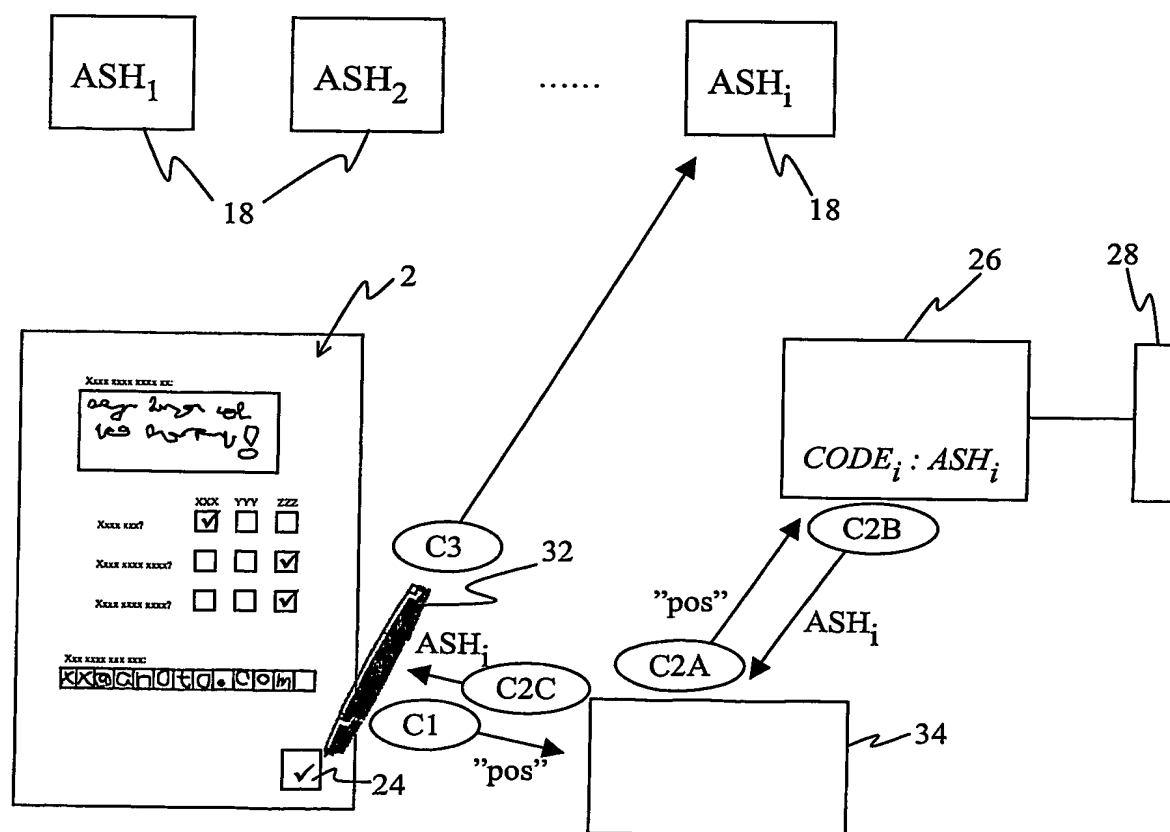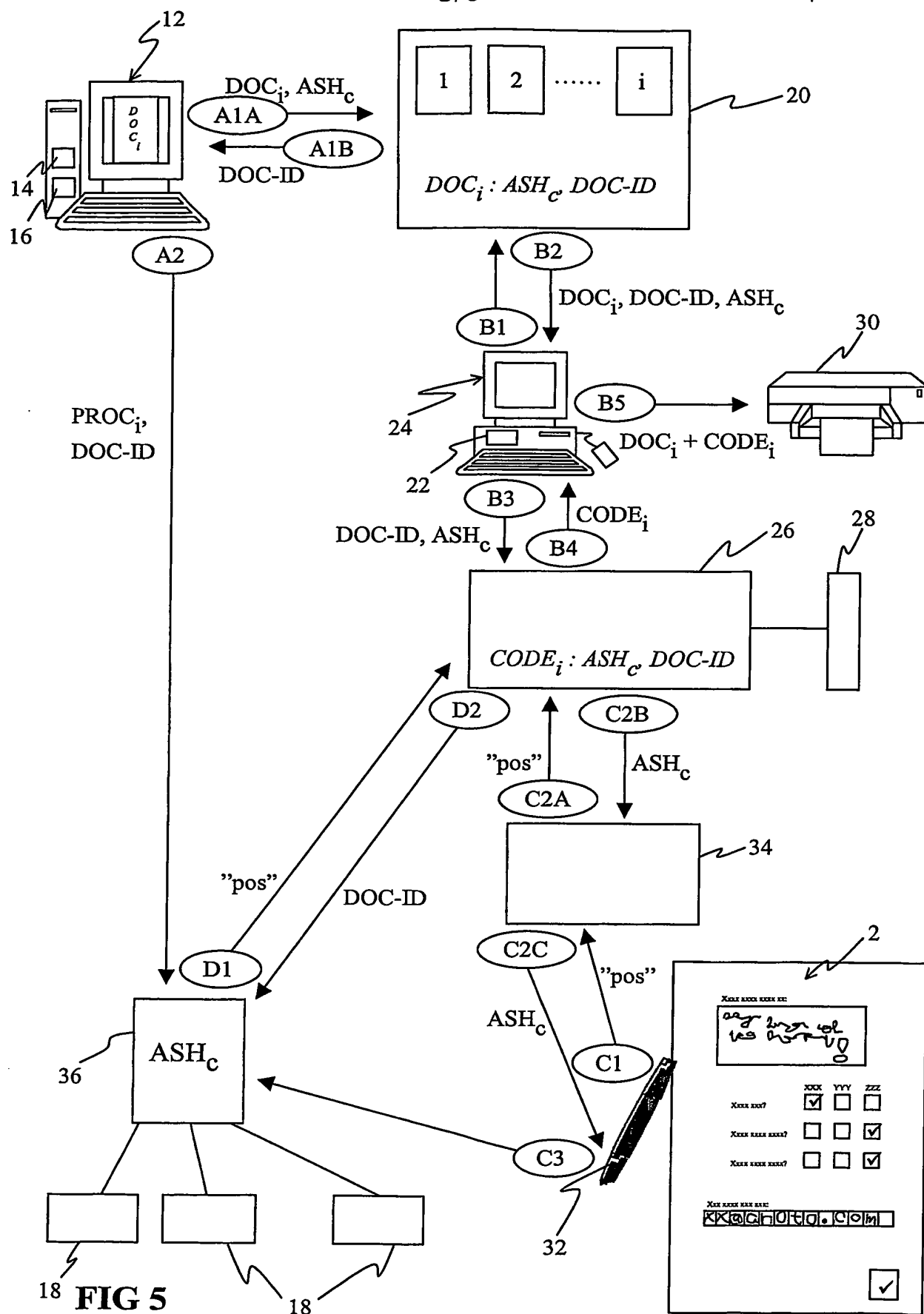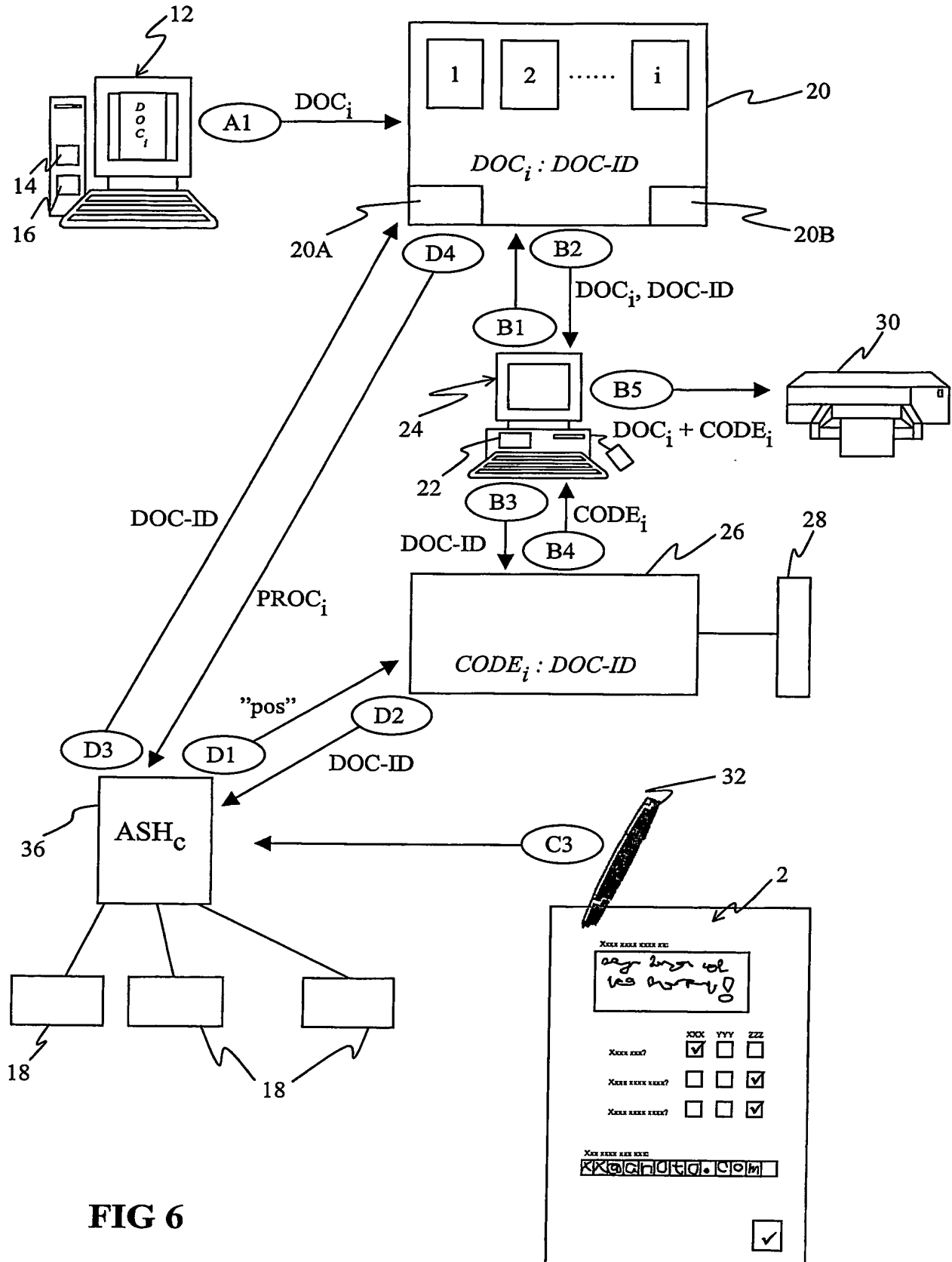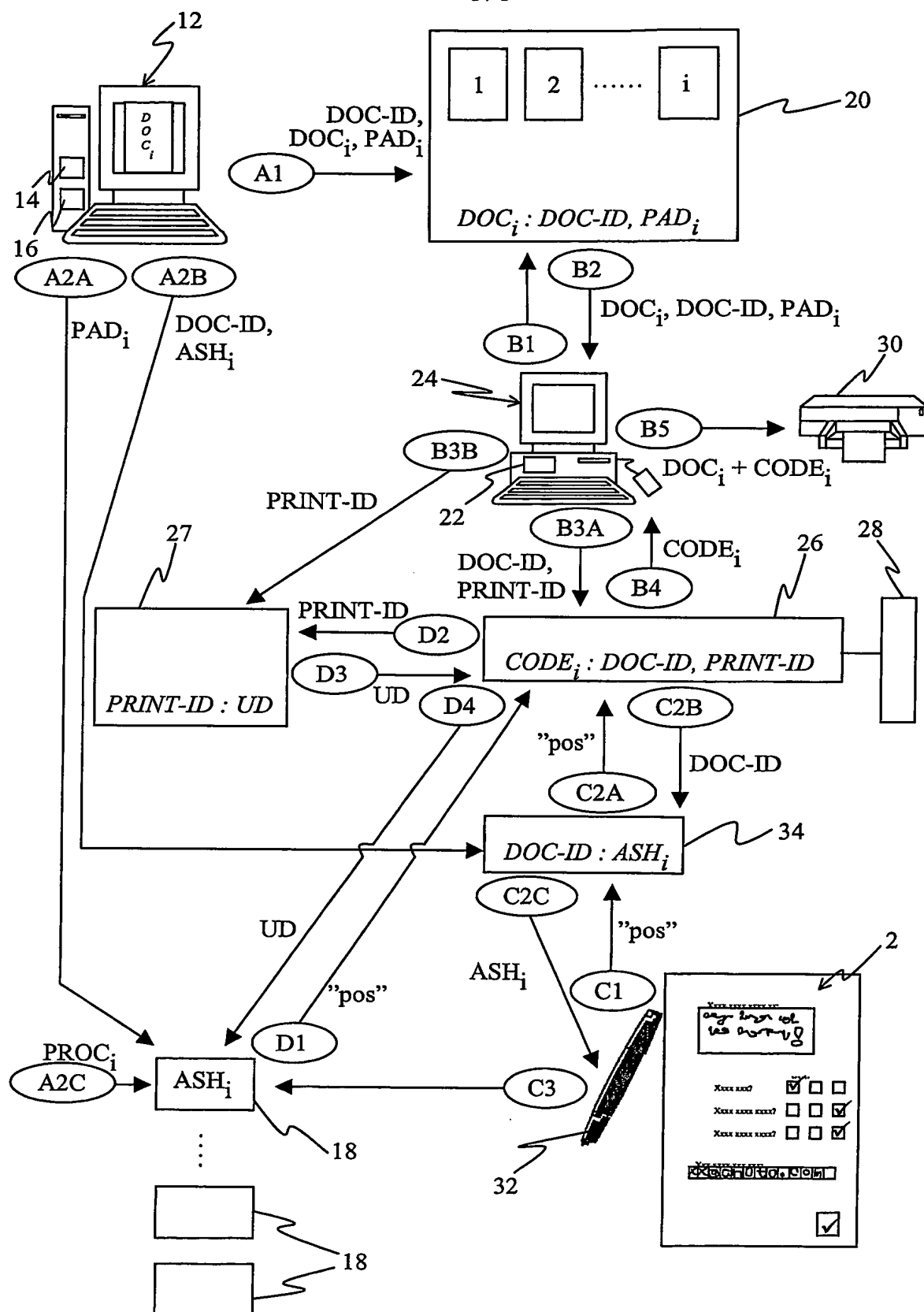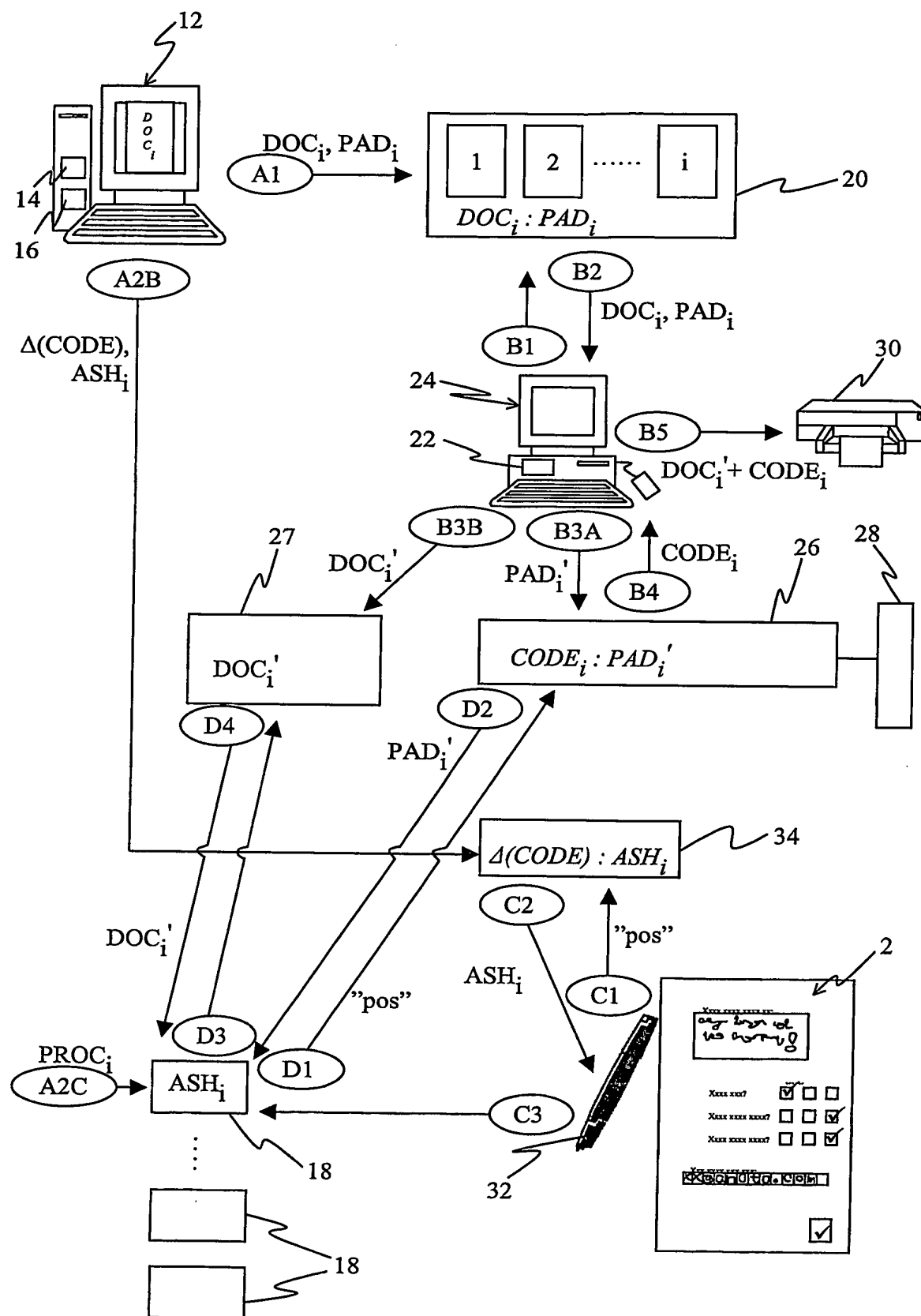
FIG 1

FIG 2

FIG 3

FIG 4

FIG 5

FIG 6

5/6

FIG 7

6/6

FIG 8

INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06K 11/06, G06F 3/033

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G06F, G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 0219260 A1 (ANOTO AB), 7 March 2002 (07.03.2002), claims 1-30, abstract, cited in Application	1-50
A	WO 0275629 A1 (ANOTO AB), 26 Sept 2002 (26.09.2002), claims 1-37, abstract	1-50
A	WO 9950787 A1 (XEROX CORP), 7 October 1999 (07.10.1999), page 1, line 3 - page 3, line 19, claims 1-8, abstract, cited in Application	1-50
A	WO 0148591 A1 (ANOTO AB), 5 July 2001 (05.07.2001), claims 1-44, abstract, cited in Application	1-50

| X | Further documents are listed in the continuation of Box C. | | X | See patent family annex. |

*	Special categories of cited documents:
"A"	document defining the general state of the art which is not considered to be of particular relevance
"E"	earlier application or patent but published on or after the international filing date
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O"	document referring to an oral disclosure, use, exhibition or other means
"P"	document published prior to the international filing date but later than the priority date claimed

"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X"	document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y"	document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
8 January 2004	2 3 -01- 2004

Name and mailing address of the ISA/	Authorized officer
Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86	Roger Bou Faisal /LR Telephone No. +46 8 782 25 00

Form PCT/ISA/210 (second sheet) (July 1998)

C (Continuation).	DOCUMENTS CONSIDERED TO BE RELEVANT	
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 0171473 A1 (ANOTO AB), 27 Sept 2001 (27.09.2001), claims 1-22, abstract --	1-50
A	WO 0175781 A1 (ANOTO AB), 11 October 2001 (11.10.2001), claims 1-34, abstract -- --------	1-50

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
WO	0219260	A1	07/03/2002	AU	2567801 A	09/07/2001
				AU	2567901 A	09/07/2001
				AU	2569301 A	09/07/2001
				AU	5281201 A	20/11/2001
				AU	7046700 A	26/03/2001
				AU	8458001 A	13/03/2002
				BR	0014156 A	14/05/2002
				BR	0016610 A	03/09/2002
				CA	2381980 A	08/03/2001
				CA	2394922 A	05/07/2001
				CA	2406581 A	15/11/2001
				CN	1413336 T	23/04/2003
				EP	1214641 A	19/06/2002
				EP	1244955 A	02/10/2002
				EP	1244996 A	02/10/2002
				EP	1259933 A	27/11/2002
				EP	1282820 A	12/02/2003
				EP	1316058 A	04/06/2003
				JP	2003508843 T	04/03/2003
				JP	2003518688 T	10/06/2003
				JP	2003518698 T	10/06/2003
				JP	2003519423 T	17/06/2003
				JP	2003533678 T	11/11/2003
				SE	0001667 D	00/00/0000
				SE	0100724 A	02/09/2002
				US	2002001852 A	03/01/2002
				US	2002040816 A	11/04/2002
				US	2002091711 A	11/07/2002
				US	2003046256 A	06/03/2003
				US	2003061188 A	27/03/2003
				WO	0148591 A	05/07/2001
				WO	0148678 A	05/07/2001
				WO	0148685 A	05/07/2001
				WO	0186302 A	15/11/2001
				AU	4703801 A	30/01/2002
				SE	518150 C	03/09/2002
				SE	0002640 A	15/10/2001
				WO	0206137 A	24/01/2002
				SE	0002641 D	00/00/0000
				AU	7119801 A	30/01/2002
				SE	0002659 A	14/01/2002
				SE	0101586 D	00/00/0000
				WO	0205692 A	24/01/2002
				AU	4698101 A	30/10/2001
				EP	1274385 A	15/01/2003
				SE	519260 C	04/02/2003
WO	0275629	A1	26/09/2002	NONE		

Form PCT/ISA/210 (patent family annex) (July 1998)

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
WO	9950787	A1	07/10/1999	GB	9806973	D	00/00/0000
				US	6330976	B	18/12/2001
				US	6345304	B	05/02/2002
				US	2002020750	A	21/02/2002
				US	2003190145	A	09/10/2003
				WO	9950736	A	07/10/1999
				WO	9950751	A	07/10/1999
				GB	9806977	D	00/00/0000
				GB	9807001	D	00/00/0000

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
WO	0148591	A1	05/07/2001	AU	2567801	A	09/07/2001
				AU	2567901	A	09/07/2001
				AU	2569301	A	09/07/2001
				BR	0016610	A	03/09/2002
				CA	2394922	A	05/07/2001
				CN	1413336	T	23/04/2003
				EP	1244955	A	02/10/2002
				EP	1244996	A	02/10/2002
				EP	1259933	A	27/11/2002
				JP	2003518688	T	10/06/2003
				JP	2003518698	T	10/06/2003
				JP	2003519423	T	17/06/2003
				SE	9904745	A	24/06/2001
				US	2002091711	A	11/07/2002
				US	2003046256	A	06/03/2003
				US	2003061188	A	27/03/2003
				WO	0148678	A	05/07/2001
				WO	0148685	A	05/07/2001
				AU	3430801	A	27/08/2001
				AU	3430901	A	27/08/2001
				AU	4156200	A	09/10/2000
				EP	1166452	A	02/01/2002
				EP	1259874	A	27/11/2002
				EP	1285329	A	26/02/2003
				JP	2003523572	T	05/08/2003
				SE	0000541	A	19/08/2001
				SE	0000939	A	19/08/2001
				US	D448422	S	25/09/2001
				US	2001035861	A	01/11/2001
				US	2002044134	A	18/04/2002
				US	2002080895	A	27/06/2002
				WO	0161454	A	23/08/2001
				WO	0161455	A	23/08/2001
				AU	4964600	A	05/12/2000
				AU	4965500	A	05/12/2000
				SE	0000952	A	22/09/2001
				AU	5263500	A	18/12/2000
				AU	5860700	A	02/01/2001
				AU	7046700	A	26/03/2001
				AU	7046800	A	26/03/2001
				BR	0014156	A	14/05/2002
				CA	2374808	A	07/12/2000
				CA	2381980	A	08/03/2001
				CN	1377483	T	30/10/2002
				EP	1188142	A	20/03/2002
				EP	1214641	A	19/06/2002
				EP	1221132	A	10/07/2002
				JP	2003500777	T	07/01/2003
				JP	2003508831	T	04/03/2003
				JP	2003508843	T	04/03/2003
				SE	0001239	A	06/10/2001
				US	6502756	B	07/01/2003
				WO	0073981	A	07/12/2000
				WO	0116691	A	08/03/2001
				WO	0116872	A	08/03/2001

Patent document cited in search report			Publication date	Patent family member(s)			Publication date
WO	0148591	A1	05/07/2001	AU	5281201	A	20/11/2001
				AU	8458001	A	13/03/2002
				CA	2406581	A	15/11/2001
				EP	1282820	A	12/02/2003
				EP	1316058	A	04/06/2003
				JP	2003533678	T	11/11/2003
				SE	0001667	D	00/00/0000
				SE	0100724	A	02/09/2002
				US	2002001852	A	03/01/2002
				US	2002040816	A	11/04/2002
				WO	0186302	A	15/11/2001
				WO	0219260	A	07/03/2002
WO	0171473	A1	27/09/2001	AU	3965301	A	03/10/2001
				AU	4965100	A	05/12/2000
				CA	2371052	A	23/11/2000
				CA	2400732	A	27/09/2001
				CN	1418339	T	14/05/2003
				EP	1191993	A	03/04/2002
				EP	1269300	A	02/01/2003
				JP	2003528387	T	24/09/2003
				SE	517984	C	13/08/2002
				SE	0000945	A	22/09/2001
				US	D453695	S	19/02/2002
				US	6602310	B	05/08/2003
				US	2002008721	A	24/01/2002

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
WO	0175781	A1	11/10/2001	AU	762244 B	19/06/2003
				AU	3965601 A	15/10/2001
				AU	4699601 A	15/10/2001
				AU	5861100 A	02/01/2001
				BR	0011673 A	12/03/2002
				CA	2384339 A	21/12/2000
				CA	2400617 A	11/10/2001
				CN	1418350 T	14/05/2003
				EE	200100674 A	17/02/2003
				EP	1192154 A	03/04/2002
				EP	1272971 A	08/01/2003
				EP	1275081 A	15/01/2003
				HU	0202929 A	28/02/2003
				IL	146752 D	00/00/0000
				JP	2003502328 T	21/01/2003
				JP	2003529985 T	07/10/2003
				NO	20016127 A	12/02/2002
				NZ	516015 A	30/06/2003
				SE	516281 C	10/12/2001
				SE	0001253 A	06/10/2001
				SK	18282001 A	03/12/2002
				US	2001038383 A	08/11/2001
				US	2002011989 A	31/01/2002
				WO	0175780 A	11/10/2001
				AU	6649201 A	22/03/2002
				AU	8635501 A	22/03/2002
				EP	1317705 A	11/06/2003
				SE	519820 C	15/04/2003
				SE	0003195 A	08/03/2002
				US	2002033414 A	21/03/2002
				US	2002053596 A	09/05/2002
				WO	0221252 A	14/03/2002
				WO	0221431 A	14/03/2002
				SE	0004157 A	14/05/2002

Form PCT/ISA/210 (patent family annex) (July 1998)

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Box No. VIII (iii)   DECLARATION: ENTITLEMENT TO CLAIM PRIORITY

The declaration must conform to the standardized wording provided for in Section 213; see Notes to Boxes Nos. VIII, VIII (i) to (v) (in general) and the specific Notes to Box No. VIII (iii). If this Box is not used, this sheet should not be included in the request.

Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application specified below, where the applicant is not the applicant who filed the earlier application or where the applicant's name has changed since the filing of the earlier application (Rules 4.17(iii) and 51*bis*.1(a)(iii)):

in relation to international application No. PCT/SE03/01643,

ANOTO AB is entitled to claim priority of earlier application No. 60/421 055 by virtue of the following:

(i)   the applicant is the inventor of the subject matter for which protection was sought by way of the earlier application.

ANOTO AB was entitled as employer of the inventors, SKANTZE, Kristofer and HOLLMAN, Joachim.

(iv)   an assignment from SKANTZE, Kristofer and HOLLMAN, Joachim to ANOTO AB dated 17 October 2002 and 21 October 2002.

(ix)   this declaration is made for the purposes of all designations.

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iii)".

Form PCT/RO/101 (declaration sheet (iii)) (January 2004)   *See Notes to the request form*

SUBSTITUTE SHEET (RULE 26)

| Box No. VIII (ii) | DECLARATION: ENTITLEMENT TO APPLY FOR AND BE GRANTED A PATENT |

The declaration must conform to the standardized wording provided for in Section 212; see Notes to Boxes Nos. VIII, VIII (i) to (v) (in general) and the specific Notes to Box No.VIII (ii). If this Box is not used, this sheet should not be included in the request.

Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent (Rules 4.17(ii) and 51*bis*.1(a)(ii)), in a case where the declaration under Rule 4.17(iv) is not appropriate:

in relation to this international application No. PCT/SE03/01643,

Anoto AB is entitled to apply for and be granted a patent by virtue of the following:

(i) SKANTZE, Kristofer of Jutahusgatan 6, SE-222 29 LUND, HOLLMAN, Joachim of Mosebacketorg 14, SE-116 20 STOCKHOLM and LYNGGAARD, Stefan of c/o Boström, Björnbärsstigen 3, SE-227 38 LUND are the inventors of the subject matter for which protection is sought by way of the international application

(ii) Anoto AB was entitled as employer of the inventors SKANTZE, Kristofer, HOLLMAN, Joachim and LYNGGAARD, Stefan

(iv) an assignment from SKANTZE, Kristofer, HOLLMAN, Joachim and LYNGGAARD, Stefan to Anoto AB, dated 17 October 2002, 21 October 2002 and 23 October 2003.

(ix) this declaration is made for the purposes of :
(a) all designations except the designation of the United States of America.

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (ii)".

Form PCT/RO/101 (declaration sheet (ii)) (March 2001; reprint July 2003)   *See Notes to the request form*

SUBSTITUTE SHEET (RULE 26)

Box No. VIII (iv)   DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)

The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII(i) to (v) (in general) and the specific Notes to Box No.VIII (iv). If this Box is not used, this sheet should not be included in the request.

Declaration of inventorship (Rules 4.17(iv) and 51bis.1(a)(iv))
for the purposes of the designation of the United States of America:

I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/ SE03/01643 ....(if furnishing declaration pursuant to Rule 26ter).

I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.

I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications," by application number, country or Member of the World Trade Organization, day, month and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.

Prior Applications: ....

I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or. imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name: HOLLMAN, Joachim ....

Residence: STOCKHOLM, Sweden ....

(city and either US state, if applicable, or country)

Mailing Address: Mosebacke Torg 14, SE-116 20 STOCKHOLM, Sweden ....

Citizenship: Swedish ....

Inventor's Signature: ....   Date: OCT.22, 2003 ....

| (if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent) | (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application) |

Name: ....

Residence: ....

(city and either US state, if applicable, or country)

Mailing Address: ....

Citizenship: ....

Inventor's Signature: ....   Date: ....

| (if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent) | (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application) |

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

Form PCT/RO/101 (declaration sheet (iv)) (March 2001; reprint July 2003)   *See Notes to the request form*

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Box No. VIII (iv) DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)

The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII(i) to (v) (in general) and the specific Notes to Box No. VIII (iv). If this Box is not used, this sheet should not be included in the request.

Declaration of inventorship (Rules 4.17(iv) and 51bis.1(a)(iv))
for the purposes of the designation of the United States of America:

I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/ ___SE03/01643___ (if furnishing declaration pursuant to Rule 26ter).

I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.

I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications," by application number, country or Member of the World Trade Organization, day, month and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.

Prior Applications: ....

I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name: **SKANTZE, Kristofer** ....

Residence: **LUND, Sweden** ....

(city and either US state, if applicable, or country)

Mailing Address: **Jutahusgatan 6, SE-222 29 LUND, Sweden** ....

Citizenship: **Swedish** ....

Inventor's Signature: .... Date: Lund October 14, 2003

(if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent) | (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)

Name: ....

Residence: ....

(city and either US state, if applicable, or country)

Mailing Address: ....

Citizenship: ....

Inventor's Signature: .... Date: ....

(if not contained in the request, or if declaration is corrected or added under Rule 26ter after the filing of the international application. The signature must be that of the inventor, not that of the agent) | (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26ter after the filing of the international application)

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

Form PCT/RO/101 (declaration sheet (iv)) (March 2001; reprint July 2003)   *See Notes to the request form*

SUBSTITUTE SHEET (RULE 26)

Box No. VIII (iv) DECLARATION: INVENTORSHIP (only for the purposes of the designation of the United States of America)

The declaration must conform to the following standardized wording provided for in Section 214; see Notes to Boxes Nos. VIII, VIII(i) to (v) (in general) and the specific Notes to Box No.VIII (iv). If this Box is not used, this sheet should not be included in the request.

Declaration of inventorship (Rules 4.17(iv) and 51bis.1(a)(iv))
for the purposes of the designation of the United States of America:

I hereby declare that I believe I am the original, first and sole (if only one inventor is listed below) or joint (if more than one inventor is listed below) inventor of the subject matter which is claimed and for which a patent is sought.

This declaration is directed to the international application of which it forms a part (if filing declaration with application).

This declaration is directed to international application No. PCT/ SE03/01643 ....(if furnishing declaration pursuant to Rule 26*ter*).

I hereby declare that my residence, mailing address, and citizenship are as stated next to my name.

I hereby state that I have reviewed and understand the contents of the above-identified international application, including the claims of said application. I have identified in the request of said application, in compliance with PCT Rule 4.10, any claim to foreign priority, and I have identified below, under the heading "Prior Applications," by application number, country or Member of the World Trade Organization, day, month and year of filing, any application for a patent or inventor's certificate filed in a country other than the United States of America, including any PCT international application designating at least one country other than the United States of America, having a filing date before that of the application on which foreign priority is claimed.

Prior Applications: ....

I hereby acknowledge the duty to disclose information that is known by me to be material to patentability as defined by 37 C.F.R. § 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the PCT international filing date of the continuation-in-part application.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Name: **LYNGGAARD, Stefan** ....

Residence: **LUND, Sweden** ....

(city and either US state, if applicable, or country)

Mailing Address: **c/o Boström, Björnbärsstigen 3, SE-227 38 LUND, Sweden** ....

Citizenship: **Swedish** ....

Inventor's Signature: ...*Stefan Lynggaard*........ Date: 2003-10-17

(if not contained in the request, or if declaration is corrected or added under Rule 26*ter* after the filing of the international application. The signature must be that of the inventor, not that of the agent) | (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26*ter* after the filing of the international application)

Name: ....

Residence: ....

(city and either US state, if applicable, or country)

Mailing Address: ....

Citizenship: ....

Inventor's Signature: .... Date: ....

(if not contained in the request, or if declaration is corrected or added under Rule 26*ter* after the filing of the international application. The signature must be that of the inventor, not that of the agent) | (of signature which is not contained in the request, or of the declaration that is corrected or added under Rule 26*ter* after the filing of the international application)

☐ This declaration is continued on the following sheet, "Continuation of Box No. VIII (iv)".

Form PCT/RO/101 (declaration sheet (iv)) (March 2001; reprint July 2003)   *See Notes to the request form*

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